

### **REMARKS**

Claims 1-22 are currently pending in the subject application, and are presently under consideration. Claims 1-22 are rejected. Favorable reconsideration of the application is requested in view of the comments herein.

#### **I. Compliance of Claims 1 and 9-12 With 35 U.S.C. §112, Sixth Paragraph**

In the Office Action dated October 17, 2008 (hereinafter "Office Action"), the Examiner states that "since the 'means for' functional language is modified by a sufficient structure, whereby the sufficient structure is a quasi-optical isolator, claim 1 fails to comply with the 3-prong analysis and does not invoke 35 U.S.C. §112, Sixth Paragraph," (Office Action, page 2). Representative for Applicant respectfully submits that claim 1 was amended in the Response to the Office Action dated January 29, 2007; filed May 29, 2007 (hereinafter "Prior Response"), to remove the quasi-optical isolator from claim 1. Representative for Applicant assumes that the inclusion of this portion of the Office Action is leftover from the Office Action dated January 29, 2007, and is thus a mistake. Recognition that claim 1 invokes 35 U.S.C. §112, Sixth Paragraph, is respectfully requested.

The Examiner also asserts that "applicant has failed to distinctly point out in the written description the sufficient structure which represents the 'scanning means'" with respect to claims 1, 9, and 10 (Office Action, page 2). Representative for Applicant respectfully disagrees. Paragraph 41 of the Present Application provides adequate written description that distinctly points out in the written description the sufficient structure that is representative for the scanning means. The Examiner further asserts that "applicant has failed to distinctly point out in the written description the sufficient structure which represents the 'indexing means'" with respect to claims 11 and 12 (Office Action, pages 2-3). Representative for Applicant respectfully disagrees. Paragraph 47 of the Present Application provides adequate written description that distinctly points out in the written description the sufficient structure that is representative for the indexing means. Therefore, recognition that claims 1 and 9-12 invoke 35 U.S.C. §112, Sixth Paragraph, is respectfully requested.

**II. Rejection of Claims 1-3, 8, 17-19, and 22 Under 35 U.S.C. §103(a)**

Claims 1-3, 8, 17-19 and 22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,407,292 to Edrich ("Edrich") in view of U.S. Patent No. 5,760,397 to Huguenin ("Huguenin"). Withdrawal of this rejection is respectfully requested for at least the following reasons. In addition, Representative for Applicant respectfully submits that a number of the arguments that are presented below were also presented in the Prior Response, to which the Examiner failed to address in the Office Action.

Claim 1 recites a collector for collecting radiation emitted from a patient and directing that radiation along a collection path to the detector in such a manner that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path. In the Office Action, the Examiner asserts that Edrich teaches this element of claim 1 based on the waveguide and receiving horn disclosed in Edrich (Office Action, page 7; citing Edrich, Abstract and col. 2, ll. 49-55). Representative for Applicant respectfully disagrees.

Edrich describes an imager that has a feedhorn and reflector in a near-field focusing arrangement to focus thermal radiation to a spot that indicates depth of temperature measurement based on a separation of the visible light beams (Edrich, col. 2, ll. 48-55 and 58-61; col. 3, ll. 60-64). The reflector height is automatically adjusted based on the desired depth of temperature measurement, and scanning is performed in a raster fashion along a line and orthogonal to that line (Edrich, col. 2, line 62 through col. 3, line 4). Therefore, Edrich teaches a static sensitivity profile along the scanned collection path of the beam. Specifically, the teachings of Edrich are directed to a system that scans the thermal radiation at a known focal point that corresponds to the desired depth of thermal measurement.

In a near-field focusing arrangement, such as taught by Edrich, beam shape varies strongly with propagation distance, causing irregularity/asymmetry in the beam pattern at distances away from the focal plane. Support for this can be found in a number of sources. One such source describes the distinction between near-field and far-field focusing as follows:

In the far or Fraunhofer region, the measureable field components are transverse to the radial direction from the antenna and all power flow is directed radially outwards. In the far field the shape of the field pattern is independent of the distance. In the near or Fresnel region, the longitudinal component of the electric field may be significant and power flow is not entirely radial. In the near field, the shape of the field pattern depends, in general, on the distance. (*Antennas*, J.D. Kraus, McGraw Hill, 2<sup>nd</sup> Edition, 1988, page 60).

In addition, attached is a copy of FIG. 6.2 of *Microwave Antenna Theory and Design*, Edited by Samuel Silver, IEEE, 1997, page 173. The attached Figure demonstrates a strong variation of electric field as a function of distance in the near field.

The system of Edrich overcomes the variation of beam shape as a function of propagation distance by automatically adjusting the height of the reflector to maintain the desired depth of thermal measurement (Edrich, col. 2, line 62 through col. 3, line 4). Thus, there is no indication that Edrich contemplates antenna design considerations in overcoming beam shape variation as a function of propagation distance. In the Present Application, however, a fundamental Gaussian mode beam is implemented in scanning, which maintains its Gaussian intensity profile at all distances as it propagates through near and far fields, thus resulting in the defined sensitivity profile across and along substantially the entire length of the collection path, as recited in claim 1 (see, *e.g.*, Present Application, paragraph 45). The disclosure of Edrich provides no teaching or suggestion of scanning methods or implementations to result in comparable scanning that provides a defined sensitivity profile. Therefore, Edrich does not teach or suggest that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path, as recited in claim 1.

The Present Application provides further insight as to the distinction between the language of claim 1 and the teachings of Edrich. Specifically, the Present Application describes that Edrich has poor spatial resolution, as well as long image acquisition time due to the relative insensitivity of the receiver (Present Application, page 2, ll. 1-5). The Present Application also states that, because the sensitivity profile of the collected radiation is defined along the entire length of the collection path, the knowledge of the beam incident on the reflector is improved based on the radiation being propagated in a well-controlled and definable pattern (Present

Application, page 2, ll. 19-25). As a result, the Examiner's assertion that Edrich teaches that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path, as recited in claim 1, is internally inconsistent. In other words, there is no need for a sensitivity profile to be known along the collection path, as indicated in the language of claim 1, in a system where the height of the reflector is adjusted such that the beam has a constant sensitivity, as taught by Edrich. Therefore, Edrich does not teach or suggest that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path, as recited in claim 1.

Claim 1 also recites a isolation means in the path of the collected radiation for preventing signal leakage from the detector being emitted towards the patient's body. The Examiner relies on Huguenin to teach this element of claim 1 (Office Action, pages 7-8; citing Huguenin, reference number 184). Representative for Applicant respectfully submits that Huguenin does not teach or suggest a quasi-optical isolator in the path of the collected radiation for preventing signal leakage from the detector being emitted towards the patient's body, as recited in claim 1.

Huguenin teaches a camera that receives signals at 94 GHz (*i.e.*, the RF frequency) and uses an array of heterodyne receivers based around subharmonic mixers which are pumped at a local oscillator (LO) frequency of 47 GHz that is half that of the incoming radiation (see *e.g.*, Huguenin, col. 6, ll. 37-49). The 47 GHz LO signal is generated in an LO assembly that launches the 47 GHz LO signal from a feed 170 to a focal plane array that also receives the 94 GHz input signal to downconvert the input signal to a sideband intermediate frequency (IF) of approximately 2.5 GHz (Huguenin, col. 6, ll. 41-49). The isolator 184 cited in the rejection of claim 1 is part of the LO assembly that transmits the LO signal to the focal plane array (Huguenin, FIG. 11; col. 6, line 66 through col. 7, line 2). Therefore, the isolator of Huguenin cited in the rejection of claim 1 is not in the path of the collected radiation and does not prevent signal leakage from the detector. Instead, the isolator 184 taught by Huguenin is simply present to prevent any back reflections from the feedhorn that transmit the 47GHz LO signal, which might otherwise become unstable. In the system taught by Huguenin, there may still be 94GHz leaking out of the front of the receiver array towards the captured scene. Accordingly, Huguenin

does not teach or suggest isolation means in the path of the collected radiation for preventing signal leakage from the detector being emitted towards the patient's body, as recited in claim 1.

For the above described reasons, neither Edrich nor Huguenin, individually or in combination, teach or suggest claim 1. Withdrawal of the rejection of claim 1, as well as claims 2-22 which depend therefrom, is respectfully requested.

Claim 19 depends from claim 1 and recites that the scanning means scans the target area of the patient such that the collection path is in the form of a circumference of a notional cylinder at each of a plurality of indexed steps. The Office Action fails to address the language of claim 19, but instead merely groups the rejection of claim 19 into the reasons for the rejection of claims 1, 8, 17, and 18 without providing any basis or reasoning as to why claim 19 is rejected. Representative for Applicant respectfully submits that none of the cited art teaches or suggests claim 19. Withdrawal of the rejection of claim 19 is respectfully requested.

With regard to claim 22, the Examiner states that "it would have been obvious to provide a simple substitution of one form of isolator for another in order to obtain predictable results of leakage prevention, wherein the isolator is substituted for a quasi-optical isolator," (Office Action, page 4). However, the Examiner provides an improper basis as to why such a modification would be obvious, in that "obtaining predictable results" is insufficient for demonstrating why a person of ordinary skill would replace the isolator of Huguenin with a quasi-optical isolator. The Examiner also provides no support for this statement, and fails to tie this assertion to the teachings of Huguenin and/or Edrich, thus failing to recognize that such an isolator is in the path of the collected radiation, as recited in claim 1 from which claim 22 depends. Therefore, neither Edrich nor Huguenin, individually or in combination, teaches or suggests claim 22. Withdrawal of the rejection of claim 22 is respectfully requested.

For the reasons described above, claims 1, 8, 17-19, and 22 should be patentable over the cited art. Accordingly, withdrawal of this rejection is respectfully requested.

**III. Rejection of Claims 4, 5, 20, and 21 Under 35 U.S.C. §103(a)**

Claims 4, 5, 20, and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin, further in view of U.S. Patent No. 5,785,426 to Woskov, et al. ("Woskov"). Claims 4, 5, 20, and 21 depend from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1.

In addition, the Examiner relies on Woskov to teach or suggest the elements of claims 4 and 5 (Office Action, page 8; citing Woskov, col. 3, ll. 8-10; col. 6, ll. 7-24 and 28-35). Woskov teaches a pyrometer that includes a heterodyne millimeter/sub-millimeter-wave receiver adapted to receive radiation from a surface whose temperature is to be measured (Woskov, Abstract). However, Woskov does not cure the deficiencies of Edrich and Huguenin to teach or suggest claim 1, from which claims 4 and 5 depend. Therefore, Edrich, Huguenin, and Woskov, individually or in combination, do not teach or suggest claims 4 and 5. Withdrawal of the rejection of claims 4 and 5 is respectfully requested.

With regard to claims 20 and 21, claim 20 recites that a given spot on the collection path resides on a focal plane of the scanning means, such that the sensitivity profile is symmetrical and reduced about the given spot along the collection path, and claim 21 recites that the defined sensitivity profile of the collection path is non-uniform across and along the collection path based on known changes in a location of a focal spot of the scanning means along the collection path. The Office Action fails to address the language of claims 20 and 21, but instead merely groups the rejection of claims 20 and 21 into the reasons for the rejection of claims 4 and 5 without providing any basis or reasoning as to why claims 20 and 21 are rejected. Representative for Applicant respectfully submits that none of the cited art teaches or suggests claims 20 and 21. Withdrawal of the rejection of claims 20 and 21 is respectfully requested.

For the reasons described above, claims 4, 5, 20, and 21 should be patentable over the cited art. Accordingly, withdrawal of this rejection is respectfully requested.

**IV. Rejection of Claim 6 Under 35 U.S.C. §103(a)**

Claim 6 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin, further in view of U.S. Patent No. 4,852,973 to Durnin, et al. (Durnin").

Withdrawal of this rejection is respectfully requested for at least the following reasons.

Representative for Applicant also respectfully submits that the following argument for the patentability of claim 6 was presented in the Prior Response, but that the Office Action fails to address it.

Claim 6 depends from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, claim 6 recites that the collector is such that the collected radiation has a Bessel sensitivity profile. The Examiner relies on Durnin to teach the elements of claim 6 by stating that Durnin teaches collecting radiation that has a Bessel sensitivity profile (Office Action, page 9; citing Durnin, Abstract). Representative for Applicant respectfully disagrees. Durnin teaches generating a well defined traveling wave beam substantially unaffected by diffractive spreading (Durnin, Abstract). The beam is generated having a transverse dependence of a Bessel function (Id.). Therefore, Durnin does not teach *collecting* radiation that has a Bessel sensitivity profile, as recited in claim 6, but instead teaches *generating* a beam that has a transverse Bessel function dependence. Therefore, Durnin does not teach or suggest that the collector is such that the collected radiation has a Bessel sensitivity profile, as recited in claim 6. Accordingly, Edrich, Huguenin, and Durnin, individually or in combination, do not teach or suggest claim 6. Withdrawal of the rejection of claim 6 is respectfully requested.

**V. Rejection of Claim 7 Under 35 U.S.C. §103(a)**

Claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin, further in view of Durnin and further in view of U.S. Patent No. 4,545,653 to Brenden, et al. ("Brenden"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 7 depends from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, in the Prior Response, claim 7 was amended to recite an axicon in the path of the collected radiation and configured to convert the Bessel sensitivity profile of the collected radiation to a Gaussian sensitivity profile. However, in rejecting claim 7, the Office Action fails to acknowledge the amendment that was made to claim 7, but instead merely rejects claim 7 for the same reasons as provided in the Office Action dated January 29, 2007. As described in the Prior Response, Brenden teaches an axicon-type focusing element implemented in an optical playback system. Neither Brenden nor any of the other cited references teach or suggest an axicon in the path of the collected radiation and configured to convert the Bessel sensitivity profile of the collected radiation to a Gaussian sensitivity profile, as recited in amended claim 7. Withdrawal of the rejection of claim 7 is respectfully requested.

**VI. Rejection of Claims 9-12 Under 35 U.S.C. §103(a)**

Claims 9-12 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin further in view of U.S. Patent No. 6,469,820 to Mushiake, et al. ("Mushiake"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claims 9-11 depend from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, the Examiner relies on Mushiake to teach or suggest the elements of claims 9 and 10 (Office Action, page 10; citing Mushiake, col. 5, ll. 24-28; col. 10, ll. 36-40). Mushiake teaches an optical scanner used to reform an original image on a CCD line sensor (Mushiake, Abstract). However, Mushiake does not cure the deficiencies of Edrich and Huguenin to teach or suggest claim 1, from which claims 9-11 depend. Therefore, Edrich, Huguenin, and Mushiake, individually or in combination, do not teach or suggest claims 9-11. Withdrawal of the rejection of claims 9-11 is respectfully requested.



Claim 12 depends from claim 11, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 11. In addition, in the Prior Response, claim 12 was amended to recite that the indexing means is operable to swing the deflector about a second axis perpendicular to the first axis. However, in rejecting claim 12, the Office Action fails to acknowledge the amendment that was made to claim 12, but instead merely rejects claim 12 for the same reasons as provided in the Office Action dated January 29, 2007. As described in the Prior Response, the Examiner asserts that Mushiake teaches means for swinging the deflector about a second axis perpendicular to the first axis (Office Action, page 10; citing Mushiake, col. 5, ll. 16-19). Representative for Applicant respectfully disagrees.

Mushiake teaches scanning by rotating a mirror in a conventional mirror-scan manner (Mushiake, col. 5, ll. 16-18). Mushiake also teaches that there is an amount of space that enables 360 degrees of rotation between an object side lens unit and an image side lens unit, and that the mirror, alone, does not rotate, but the object side lens unit rotates about the same axis to retain an optical path through the lens units via the mirror (Mushiake, col. 5, ll. 19-24; col. 4, ll. 20-27). The rotation of the mirror, as disclosed by Mushiake, is only on a single axis in angular increments of an angle  $\theta$  (Mushiake, FIG. 1). Therefore, Mushiake does not teach or suggest indexing means that is operable to swing the deflector about a second axis perpendicular to the first axis, as recited in claim 12. Accordingly, Edrich, Huguenin, and Mushiake, individually or in combination, do not teach or suggest claim 12. Withdrawal of the rejection of claim 12 is respectfully requested.

## **VII. Rejection of Claim 13 Under 35 U.S.C. §103(a)**

Claim 13 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin. Withdrawal of this rejection is respectfully requested for at least the following reasons.

The Examiner rejects claim 13 reciting the frequency range of 10-200 GHz based on overlapping ranges of 8-36 GHz, as taught by Edrich, and 30-300 GHz, as taught by Huguenin. In the Prior Response, claim 13 was amended to recite that the imager is operable to form an

image from emitted radiation in the frequency range of 90-100GHz. However, in rejecting claim 13, the Office Action fails to acknowledge the amendment that was made to claim 13, but instead merely rejects claim 13 for the same reasons as provided in the Office Action dated January 29, 2007. This amendment to claim 13 in the Prior Response obviates the frequency range taught by Edrich, and as described in the Prior Response, Representative for Applicant respectfully submits that the disclosed range of 30-300 GHz taught by Huguenin is insufficient to render obvious the frequency range of 90-100 GHz, as recited in claim 13.

The Federal Circuit has decided that, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. *In re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005). See also *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08. The frequency range recited in claim 13 (*i.e.*, spanning 10 GHz) is significantly narrower than the range disclosed in Huguenin (*i.e.*, spanning 270 GHz), and should thus be considered a species of the broad genus disclosed in Huguenin. In addition, the Present Application is directed to subcutaneous imaging, and states that "the 90-100 GHz band gives a reasonable compromise between penetration depth and spatial resolution," (Present Application, page 12, ll. 26-28). In contrast, the system of Huguenin is directed to detection of non-metallic weapons and explosives concealed under clothing (Huguenin, col. 1, ll. 9-16). Therefore, the frequency range recited in claim 13 is critical to the use described in the Present Application to achieve the intended results. The Federal Circuit has decided that criticality of a range can be used to rebut a prima facie case of obviousness based on an overlapping range. See, *e.g.*, *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). As a result, the frequency range disclosed in Huguenin does not render claim 13 obvious. Accordingly, neither Edrich nor Huguenin, individually or in combination, teach or suggest claim 13. Withdrawal of the rejection of claim 13 is respectfully requested

**VIII. Rejection of Claims 14-16 Under 35 U.S.C. §103(a)**

Claims 14-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin further in view of Woskov. Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claims 14-16 depend from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, the Examiner relies on Woskov to teach or suggest the elements of claims 14-16 (Office Action, pages 11-12; citing Woskov, col. 11, line 49 through col. 12, line 28). However, Woskov does not cure the deficiencies of Edrich and Huguenin to teach or suggest claim 1, from which claims 14-16 depend. Therefore, Edrich, Huguenin, and Woskov, individually or in combination, do not teach or suggest claims 14-16. Withdrawal of the rejection of claims 14-16 is respectfully requested.

**CONCLUSION**

In view of the foregoing remarks, Applicant respectfully submits that the present application is in condition for allowance. Applicant respectfully requests reconsideration of this application and that the application be passed to issue.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,

Date 16 March 2009

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